Gov. Doc. U.S. I.T.

U.S. Mines, Bureau of

Technical Paper 69

DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
JOSEPH A. HOLMES, DIRECTOR

PRODUCTION OF EXPLOSIVES IN THE UNITED STATES

DURING THE CALENDAR YEAR
1912

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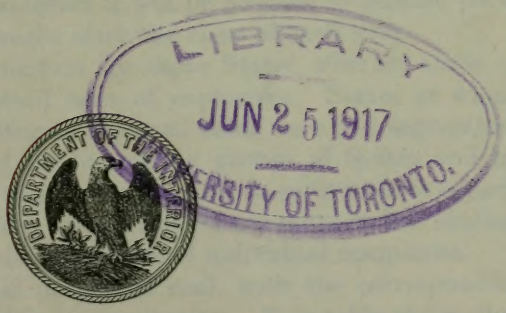
COMPILED BY
ALBERT H. FAY



WASHINGTON
GOVERNMENT PRINTING OFFICE
1914

First Edition. January, 1914.

PRODUCTION OF EXPLOSIVES IN THE UNITED STATES DURING THE CALENDAR YEAR 1912.

Compiled by ALBERT H. FAY.

The total production of explosives in the United States during 1912, according to the figures compiled, was 489,393,131 pounds, or 244,696 short tons. This production is segregated as follows:—Black powder, 230,233,369 pounds; "high" explosives (dynamite, nitroglycerin, dynalite, guncotton, etc.) other than permissible explosives, 234,469,492 pounds; and permissible explosives, 24,630,270 pounds.

As explosives are essential to mining, the Bureau of Mines undertook the compilation of information showing the total amount of explosives manufactured and used in the United States. This work was begun in May, 1913, when circular letters were sent to all manufacturers of explosives requesting that they report their total production for the year 1912. The majority of the manufacturers complied with the bureau's request within a reasonable time, although a few were more or less tardy in making returns.

This technical paper is the first publication relating solely to the production of explosives that the bureau has issued. It is expected that similar publications will be compiled annually and that with the cooperation of the manufacturers it will be possible to publish these statements within a few weeks after the close of each year.

Table 1 gives the production by those States wherein three or more manufacturers reported sales of explosives. States in which only one or two manufacturers reported sales were not segregated.

Table 2 gives the total production by groups of States and by kinds of explosives. The States are grouped so as to include regions where the general conditions of coal mining are more or less similar, and yet so as to avoid publishing sales of individual companies.

Table 3 shows the total output of coal, with the corresponding amount of explosives used in its production. This table shows that the amount of coal produced per pound of explosive varied from 0.86 ton in the group represented by Arkansas, Oklahoma, and Texas to 5.82 tons in Maryland and Virginia. The table also shows that 133 men were killed in coal mines by explosives during 1912. The number thus killed in 1911 was 134 and in 1910 was 176.

Table 4[a] shows the rapid increase in the production and sale of permissible explosives. It will be noted that in 1902 only 11,300 pounds of permissible explosives were used in coal mining, whereas in 1912 the quantity so used was 18,150,618 pounds. The quantity of permissible explosives used in the United States is larger than in a number of foreign countries, yet it represents only about 5 per cent of the total quantity of explosives. The total amount of explosives used for the production of coal in 1912 was 226,142,043 pounds, of which about 8 per cent was of the permissible class. The use of permissible explosives in coal mining has had gratifying results, and few, if any, serious accidents can be attributed directly to their use.

Table 5[a] gives the quantity of permissible explosives used for mining coal in the various coal fields. It will be noted that for 1912 only about three-fourths of the permissible explosives manufactured were used for coal mining, the remaining 6,499,652 pounds being reported as "other mining" and "all other purposes."

The figures tabulated in this paper represent the reports of 44 manufacturers who operated their plants during 1912. A number of manufacturers reported their plants as having been idle during the year or as having been sold to other manufacturers. The total number of reports received by the bureau was 130.

The reports of manufacturers of fireworks and of ammunition are not included, inasmuch as the majority of these manufacturers stated that they purchased their explosives from one or more of the manufacturers of explosives.

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[a] Hall, Clarence, and Howell, Spencer P.: Tests of permissible explosives, Bull. 66, Bureau of Mines, 1913, p. 2.

TABLE 1.—*Amount of explosives (excluding exports) manufactured in the United States and used in the various States during the calendar year 1912.*

	Black blasting powder.	High explosives other than permissible.	Permissible explosives.
	Pounds.	*Pounds.*	*Pounds.*
Alabama	5,277,375	4,542,192	3,856,130
Alaska	(a)	(a)	(a)
Arizona	(a)	(a)	(a)
Arkansas	2,776,800	1,169,946	(a)
California	(a)	(a)	(a)
Colorado	2,668,300	7,268,790	656,858
Connecticut	921,325	677,759	5,600
Delaware	(a)	79,426	----------
District of Columbia	----------	(a)	----------
Florida	91,950	1,770,182	(a)
Georgia	694,925	1,238,907	(a)
Idaho	296,200	3,749,470	(a)
Illinois	36,674,290	5,879,767	746,094
Indiana	12,503,525	2,634,435	(a)
Iowa	8,683,375	1,439,367	(a)
Kansas	11,262,555	2,417,112	63,350
Kentucky	6,435,150	2,629,495	292,933
Louisiana	(a)	877,813	(a)
Maine	157,225	666,305	----------
Maryland	651,200	1,248,727	14,450
Massachusetts	126,650	1,579,630	(a)
Michigan	544,225	23,694,970	(a)
Minnesota	5,549,725	10,647,442	(a)
Mississippi	13,050	521,245	----------
Missouri	4,334,750	17,262,890	(a)
Montana	3,306,050	(a)	(a)
Nebraska	152,475	217,310	----------
Nevada	(a)	(a)	(a)
New Hampshire	51,162	266,503	----------
New Jersey	(a)	1,976,054	(a)
New Mexico	1,178,250	1,798,225	(a)
New York	926,125	14,474,767	196,375
North Carolina	628,325	1,358,762	(a)
North Dakota	329,000	197,275	(a)
Ohio	7,565,700	6,639,698	36,550
Oklahoma	5,192,225	1,687,862	350,200
Oregon	(a)	4,070,160	----------
Pennsylvania	72,199,900	32,059,187	8,108,612
Rhode Island	(a)	197,350	(a)
South Carolina	(a)	340,327	----------
South Dakota	104,500	1,756,515	----------
Tennessee	4,656,700	3,824,012	198,790
Texas	2,025,775	1,750,382	27,131
Utah	1,551,825	4,385,460	(a)
Vermont	340,062	270,250	----------
Virginia	3,904,725	3,012,704	134,900
Washington	(a)	7,117,330	(a)
West Virginia	12,648,150	4,323,135	3,072,095
Wisconsin	250,300	5,303,415	143,150
Wyoming	3,078,275	199,275	95,700
Not segregated	10,541,250	45,247,664	6,631,352
Total	230,293,369	234,469,492	24,630,270

a Represents the product of only one or two manufacturers, and is included in item "Not segregated," at bottom of column.

TABLE 2.—*Amount of explosives used in the United States during 1912, classified by kind and use.*

Groups of States.	Black blasting powder.			High explosives other than permissible explosives.			Permissible explosives.		
	Coal mining.	Railway and other construction.	All other purposes.	Coal mining.	Other mining.	All other purposes.	Coal mining.	Other mining.	All other purposes.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Group 1. Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont	.....	57,475	635,099	2,000	45,475	2,932,563	1,000	.....	4,840
	.....	149,800	1,809,250	.....	2,538,140	14,590,440	.....	158,575	52,200
Group 2. Connecticut, New Jersey, and New York	.....	2,168,600	714,725	379,725	398,150	3,626,668	144,550	2,250	2,550
Group 3. Delaware, District of Columbia, Maryland, and Virginia.	1,677,300	3,471,625	4,402,000	15,814,080	1,527,183	14,717,924	7,880,992	60,225	167,395
Pennsylvania	64,326,275	700,150	533,450	553,320	8,300	3,761,515	3,064,045	4,000	4,050
West Virginia	11,414,550	765,225	365,050	2,300	328,735	4,377,143	.....	100	14,890
Group 4. Florida, Georgia, North Carolina, and South Carolina	326,650	426,925	721,425	351,225	52,000	4,860,705	284,203	998	60,125
Group 5. Indiana and Kentucky	17,790,325	34,400	202,600	127,725	34,300	5,717,742	740,417	.....	5,677
Illinois	36,437,290	17,475	882,050	160,400	271,350	6,207,948	2,975	1,000	32,575
Ohio	6,666,175	1,213,775	880,275	669,950	3,148,955	5,068,544	3,995,485	17,100	42,335
Group 6. Alabama, Mississippi, and Tennessee	7,853,075	109,200	5,509,550	212,500	29,078,469	10,354,858	470	63,200	147,900
Group 7. Michigan, Minnesota, and Wisconsin	725,500	425,100	1,152,525	1,391,940	14,437,075	5,507,664	80,875	953,000	29,175
Group 8. Iowa, Kansas, Missouri, and Nebraska	22,855,530	1,041,475	638,100	582,325	594,600	4,309,078	359,500	45,700	16,581
Group 9. Arkansas, Louisiana, Oklahoma, and Texas	8,322,050	638,775	779,000	120,400	7,838,925	1,711,185	100,200	37,100	100
Group 10. Montana, North Dakota, South Dakota, and Wyoming.	5,400,050	977,375	1,918,725	232,990	6,435,680	6,783,805	1,372,929	3,124,300	399,329
Group 11. Colorado, New Mexico, and Utah	2,502,775	1,670,750	655,000	253,000	4,596,920	12,767,195	120,427	951	706,689
Group 12. Alaska, Idaho, Oregon, and Washington	786,200	4,664,875	2,870,550	49,550	18,368,824	16,568,004	2,550	199,900	124,842
Group 13. Arizona, California, and Nevada	7,250								
Total	187,090,995	18,533,000	24,669,374	20,903,430	89,703,081	123,862,981	18,150,618	4,668,399	1,811,253
Total explosives, by kinds		**230,293,369**			**234,469,492**			24,630,270	

Grand total, **489,393,131.**

TABLE 3.—*Production of coal, amount of explosives used, and coal-mine fatalities due to explosives, 1912.*

States.	Coal production.[a]	Explosives used.	Coal produced per pound of explosives.	Total fatalities due to explosives.	Fatalities per 1,000,000 pounds of explosives.
	Short tons.	*Pounds.*	*Tons.*		
Pennsylvania	246,227,086	88,021,347	2.78	83	0.94
West Virginia	66,786,687	15,031,915	4.44	6	.40
Illinois	59,885,226	37,305,432	1.61	10	2.68
Ohio	34,528,727	6,829,550	5.05	6	.88
Indiana, Michigan, and Kentucky	32,982,469	19,364,223	1.70	3	.15
Alabama, Mississippi, Tennessee, Georgia, and North Carolina	22,801,531	12,847,460	1.77	5	.39
Iowa, Kansas, and Missouri	18,615,567	24,328,345	.77	5	.20
Colorado, New Mexico, and Utah	17,530,797	4,108,694	4.27	1	.24
Maryland and Virginia	12,810,676	2,201,575	5.82	10	4.54
Montana, North Dakota, and Wyoming	10,916,099	5,620,650	1.94	2	.36
Arkansas, Oklahoma, and Texas	7,964,849	9,263,875	.86	1	.11
Alaska, California, Idaho, Nevada, Oregon, and Washington	3,416,866	1,218,977	2.80	1	.82
Total	534,466,580	226,142,043	2.36	133	.59

[a] Figures from Mineral Resources of the United States, 1912; U. S. Geol. Survey, 1913.

TABLE 4.— *Yearly sales of short-flame explosives used in coal mines in the United States, 1901–1912.*

Year.	Quantity sold.	Year.	Quantity sold.
	Pounds.		*Pounds.*
1901	.....	1907	2,095,244
1902	11,300	1908	2,108,610
1903	288,661	1909	8,942,857
1904	608,270	1910	11,820,836
1905	1,031,300	1911	13,428,239
1906	1,533,575	1912	18,150,618

TABLE 5.—*Quantity of permissible explosives used in different coal fields in the United States, 1909–1912.*

Coal fields and regions.	1909	1910	1911	1912
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
1. Pennsylvania anthracite field	894,294	1,486,100	1,917,412	2,177,172
2. Northern Appalachian region[a]	5,976,625	5,967,216	6,350,272	9,190,025
3. Southern Appalachian region	1,434,950	3,188,785	3,377,268	3,995,485
4. Eastern interior field	6,955	165,975	337,012	751,005
5. Western interior field	254,475	196,560	255,050	440,825
6. Rocky Mountain region	146,700	808,200	1,177,075	1,473,129
7. Pacific coast region	228,858	8,000	14,150	122,977
	[b] 8,942,857	11,820,836	13,428,239	18,150,618

[a] Not including Pennsylvania anthracite field.
[b] Includes 344,830 pounds of short-flame explosives the permissibility of which had not been determined.

PUBLICATIONS ON TESTS OF EXPLOSIVES.

The following Bureau of Mines publications may be obtained free by applying to the Director, Bureau of Mines, Washington, D. C.:

BULLETIN 15. Investigations of explosives used in coal mines, by Clarence Hall, W. O. Snelling, and S. P. Howell, with a chapter on the natural gas used at Pittsburgh, by G. A. Burrell, and an introduction by C. E. Munroe. 1911. 197 pp., 7 pls., 5 figs.

BULLETIN 17. A primer on explosives for coal miners, by C. E. Munroe and Clarence Hall. 61 pp., 10 pls., 12 figs. Reprint of United States Geological Survey Bulletin 423.

BULLETIN 48. The selection of explosives used in engineering and mining operations, by Clarence Hall and S. P. Howell. 1913. 50 pp., 3 pls., 7 figs.

BULLETIN 51. The analysis of black powder and dynamite, by W. O. Snelling and C. G. Storm. 1913. 80 pp., 5 pls., 5 figs.

BULLETIN 59. Investigations of detonators and electric detonators, by Clarence Hall and S. P. Howell. 1913. 73 pp., 7 pls., 5 figs.

BULLETIN 66. Tests of permissible explosives, by Clarence Hall and S. P. Howell. 1913. 313 pp., 1 pl., 6 figs.

TECHNICAL PAPER 6. The rate of burning of fuse as influenced by temperature and pressure, by W. O. Snelling and W. C. Cope. 1912. 28 pp.

TECHNICAL PAPER 7. Investigations of fuse and miners' squibs, by Clarence Hall and S. P. Howell. 1912. 19 pp.

TECHNICAL PAPER 12. The behavior of nitroglycerin when heated, by W. O. Snelling and C. G. Storm. 1912. 14 pp., 1 pl., 2 figs.

TECHNICAL PAPER 17. The effect of stemming on the efficiency of explosives, by W. O. Snelling and Clarence Hall. 1912. 20 pp., 11 figs.

TECHNICAL PAPER 52. Permissible explosives tested prior to March 1, 1913, by Clarence Hall. 1913. 11 pp.

MINERS' CIRCULAR 6. Permissible explosives tested prior to January 1, 1912, and precautions to be taken in their use, by Clarence Hall. 1912. 20 pp.

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